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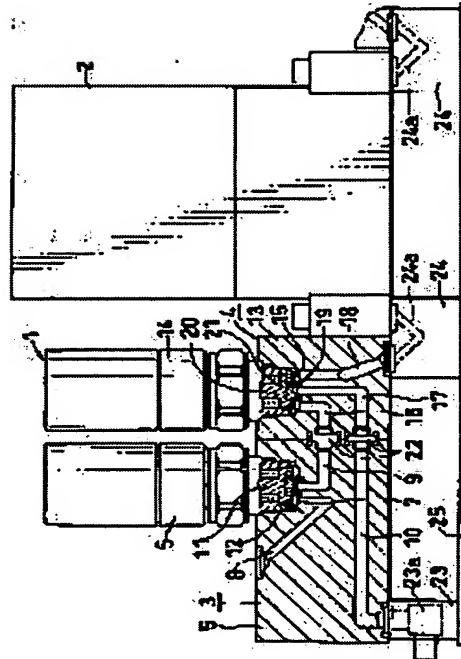
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(54) SHUT-OFF OPENER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a shut-off opener capable of replacing a fluid speedily, ensuring the purity of a fluid, and facilitating the integration of a fluid controller.

SOLUTION: A 2-port valve 3 and a 3-port valve 4 are arranged in adjacent to each other. An inflow passage 16 for a first fluid of the 3-port valve 4 is communicated to an outflow passage 18 through a valve chamber 15 at all times to shut off and open the communication of an inflow passage 17 for a second fluid with the outflow passage 18 by an actuator 14. The inflow passage 16, 17 for the first and second fluids of the 3-port valve 4 are opened on an abutting face, and the outflow passage 18 is opened on a lower face. An outflow passage 9 for the first fluid of the 2-port valve 3 is communicated to the inflow passage 16 for the first fluid of the 3-port valve 4, and an inflow passage 10 for the second fluid communicated to the inflow passage 17 for the second fluid of the 3-port valve 4 and opened on a lower face is formed in the 2-port valve 3.



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CLAIMS

[Claim(s)]

[Claim 1] The two port connection valve which has an inflow path for the 1st fluid (8), and an outflow path for the 1st fluid (9) and by which cutoff disconnection of the free passage between both paths (8) and (9) is carried out with an actuator (6) (3), It has an inflow path for the inflow path (16) for 1st fluid 2nd fluid (17), and an outflow path (18) common to the 1st fluid and the 2nd fluid. The inflow path for the 1st fluid (16) and an outflow path (18) are made always open for free passage through the valve chest (15). The three port connection valve (4) by which cutoff disconnection of the free passage with the inflow path for the 2nd fluid (17) and an outflow path (18) is carried out with an actuator (14) is arranged side by side. The inflow path for the 1st and 2nd fluids (16) of a three port connection valve (4) and (17) to an abutting surface This outflow path (18) is made to carry out opening to an inferior surface of tongue, respectively, and the outflow path for the 1st fluid (9) of a two port connection valve (3) is made open for free passage by the inflow path for the 1st fluid (16) of a three port connection valve (4). The cutoff disconnection machine with which the inflow path for the 2nd fluid (10) which opens for free passage to the inflow path for the 2nd fluid (17) of a three port connection valve (4), and is carrying out opening to the two port connection valve (3) on the inferior surface of tongue is formed further.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the cutoff disconnection machine used for the fluid control unit in semiconductor fabrication machines and equipment etc., especially, this invention is prepared in the inlet port of a massflow controller etc., and relates to the cutoff disconnection machine which switches two kinds of fluids suitably and pours them.

[0002] In this specification, about order, the upper and lower sides, and right and left, the left shall be called back a front, the upper and lower sides shall be called upper and lower sides for the right of each drawing, and right and left shall be said toward the front. This order, the upper and lower sides, and right and left may be used by the upper and lower sides, order's becoming reverse or being [it is expedient and] influenced.

[0003]

[Description of the Prior Art] Drawing 3 shows the conventional cutoff disconnection machine (81) formed in the fluid entrance side of a massflow controller (refer to JP,5-172265,A). The conventional cutoff disconnection machine (81) is equipped with the 1st closing motion valve on the backside (82), and the 2nd closing motion valve by the side of before (83). Each of double door clausium (82) and (83) is two port connection valves, the 1st closing motion valve (82) consists of the 1st valve body (84) and the 1st valve actuator (86), and the 2nd closing motion valve (83) consists of the 1st valve body (84), the 2nd valve body (85) formed in one, and the 2nd valve actuator (87). The 1st valve body (84) has the outflow path for the 1st fluid (90) where it is open for free passage through the valve chest (89) to the inflow path for the 1st fluid (88), and this inflow path (88), and cutoff disconnection of that free passage is carried out by actuation of the 1st valve actuator (86). The mainstream appearance path which the 2nd valve body (85) is always open for free passage to the outflow path for the 1st fluid (90) of the 1st valve body (84), and discharges the 1st fluid to the entrance side of a massflow controller (91), The inflow path for the 2nd fluid where an end carries out opening to the inferior surface of tongue of the 2nd valve body (85), and the other end leads to the valve chest (92) (93), While being made as [carry out / by actuation of the 2nd valve actuator (87) / it is open for free passage through the inflow path for the 2nd fluid (93), and the valve chest (92) to an end side, and / cutoff disconnection of the free passage] It has the mainstream appearance path (91) and the suboutflow path for the 2nd fluid (94) which is always open for free passage in the other end side. In drawing 3 , when (95) and (96) show diaphragm and diaphragm (95) and (96) move up and down in the valve chest (89) and (92) with vertical movement of the valve rod (97) by actuation of a valve actuator (86) and (87), and (98), cutoff disconnection of each inflow path (88) and (93) is carried out.

[0004] With this kind of cutoff disconnection vessel, by once intercepting this flow and usually pouring the 2nd fluid (for example, purge gas), after pouring the 1st fluid (for example, process gas), the 1st fluid is discharged out of a cutoff disconnection machine, it permutes by the 2nd fluid, and the activity of pouring the 1st fluid is done again after that. In the above-mentioned conventional cutoff disconnection machine (81), when changing and pouring the 1st fluid and 2nd fluid, it is as follows.

[0005] First, by operating the 1st valve actuator (86) and the 2nd valve actuator (87), making the 1st closing motion valve (82) open, and making the 2nd closing motion valve (83) close The 1st fluid is

introduced into the entrance side of a massflow controller through the inflow path (88) of the 1st valve body (84), this outflow path (90), and the mainstream appearance path (91) of the 2nd valve body (85). At this time, the suboutflow path for the 2nd fluid (94) will be filled by the 1st fluid. Subsequently, the 2nd fluid is introduced into the entrance side of a massflow controller through the suboutflow path for the inflow path (93) for 2nd fluid 2nd fluid (94), and a mainstream appearance path (91) by operating the 1st valve actuator (86) and the 2nd valve actuator (87), making the 1st closing motion valve (82) close, and making the 2nd closing motion valve (83) open. In this case, the 2nd fluid will drive out the 1st fluid which remains in the mainstream appearance path (91) following the suboutflow path for the 2nd fluid (94), and this with an own pressure, and will flow, and the outflow path for the 1st fluid (90) of the 1st valve body (84) will be filled by the 2nd fluid.

[0006]

[Problem(s) to be Solved by the Invention] In the cutoff disconnection machine, when changing and pouring the 1st fluid and 2nd fluid, it has been the very important engine performance that the permutation of a fluid is performed quickly and the purity of a fluid is secured.

[0007] In the 2nd closing motion valve (83) of the above-mentioned conventional cutoff disconnection machine (81), after pouring the 1st fluid When the 2nd fluid is introduced from the inflow path for the 2nd fluid (93), the 1st fluid collects and the outflow path for the 1st fluid (90) of the 1st valve body (84) becomes the section. The 1st fluid which collects and is in the section was only mixed with the 2nd fluid every, and there was a problem that the 2nd fluid was hard to permute by the 1st fluid.

[0008] moreover, in the fluid control unit for which this kind of cutoff disconnection machine is used Although integration of assembling so that it can take out up by the cutoff disconnection machine independent at the time of maintenance check by attaching two or more letter joints of a block in a panel, and attaching a cutoff disconnection machine ranging over these letter joints of a block is advanced With the above-mentioned conventional cutoff disconnection vessel, opening was in the front face and rear face of a valve body, and there was also a problem of being unsuitable in using for such an integration fluid control unit.

[0009] The purpose of this invention is to offer the cutoff disconnection machine which makes integration of a fluid control unit easy while the permutation of a fluid is performed quickly and the purity of a fluid is secured.

[0010]

[The means for solving a technical problem and an effect of the invention] The two port connection valve by which the cutoff disconnection machine by this invention has an inflow path for the 1st fluid, and an outflow path for the 1st fluid, and cutoff disconnection of the free passage between both paths is carried out with an actuator, It has the inflow path for the 1st fluid, an inflow path for the 2nd fluid, and an outflow path common to the 1st fluid and the 2nd fluid. The inflow path for the 1st fluid and an outflow path are made always open for free passage through the valve chest. The three port connection valve by which cutoff disconnection of the free passage with the inflow path for the 2nd fluid and an outflow path is carried out with an actuator is arranged side by side. The inflow path for the 1st and 2nd fluids of a three port connection valve makes it an abutting surface, and this outflow path is made to make opening to an inferior surface of tongue, respectively. The inflow path for the 2nd fluid which the outflow path for the 1st fluid of a two port connection valve is made to open for free passage by the inflow path for the 1st fluid of a three port connection valve, and opens for free passage to a two port connection valve at the inflow path for the 2nd fluid of a three port connection valve, and is carrying out opening to the inferior surface of tongue is formed further.

[0011] In case the 2nd fluid (for example, process gas) is poured, while making the actuator of a two port connection valve close according to the cutoff disconnection machine of this invention, that inflow path for the 2nd fluid and outflow path are made to open for free passage by making the actuator of a three port connection valve open, and the 2nd fluid is introduced from the inflow path for the 2nd fluid of a two port connection valve. Thereby, the 2nd fluid is sent to a massflow controller etc. through the inflow path for the 2nd fluid of a two port connection valve, the inflow path for the 2nd fluid of a three port connection valve, and this outflow path. Then, while making the actuator of a two port connection valve open, the inflow path for the 2nd fluid is intercepted by making the actuator of a three port connection valve close, and the 1st fluid (for example, purge gas)

is introduced from the inflow path for the 1st fluid of a two port connection valve. Thereby, the 1st fluid is sent to a massflow controller etc. through the inflow path for the 1st fluid of a two port connection valve, this outflow path, the inflow path for the 1st fluid of a three port connection valve, and this outflow path. The 1st fluid drives out the 2nd fluid which remains in the outflow path of a three port connection valve with the own pressure, and flows to the massflow controller, the condition that the 1st fluid and 2nd fluid were mixed is canceled quickly, and only the 1st fluid comes to flow for a short time.

[0012] Moreover, according to the cutoff disconnection machine of this invention, the letter joint of a block which has the path leading to that inflow path for the 2nd fluid of a two port connection valve caudad is arranged. The letter joint of a block which has the path leading to that outflow path of a three port connection valve caudad is arranged, and as these two letter joints of a block are straddled, this cutoff disconnection machine can be attached. By this The fluid control unit using a cutoff disconnection machine can be integrated easily, and maintenance check of a cutoff disconnection machine can also be performed easily.

[0013]

[Embodiment of the Invention] The gestalt of implementation of this invention is explained with reference to a drawing below.

[0014] As shown in drawing 1 , the cutoff disconnection machine (1) by this invention is formed in the entrance side (later side) of a massflow controller (2), and constitutes the fluid control unit used in semiconductor fabrication machines and equipment etc.

[0015] Cutoff disconnection machine (1) The two port connection valve on the backside (3) and the three port connection valve by the side of before (4) are arranged side by side, and are constituted.

[0016] A two port connection valve (3) consists of an actuator (6) attached in a rectangular parallelepiped-like valve body (5) and the anterior part of this from the upper part. On a valve body (5) The inflow path for the 1st fluid of the letter of the abbreviation for V characters where an end carries out opening to a posterior part top face, and the other end leads to the valve chest (7) (8), The outflow path for the 1st fluid of the letter of the abbreviation for L characters where an end carries out opening to a front face, the other end leads to the valve chest (7), and cutoff disconnection of the free passage with the inflow path for the 1st fluid (8) is carried out by the actuator (6) (9), The abbreviation inverse L-shaped inflow path for the 2nd fluid (10) is located under both paths (8) and (9), an end carries out [the path] opening to a back end section inferior surface of tongue, and the other end is carrying out [the path] opening to the front face is prepared.

[0017] A two port connection valve (3) is a diaphragm valve, and with vertical movement of the valve rod (11) by actuation of an actuator (6), when diaphragm (12) moves up and down in the valve chest (7), it carries out cutoff disconnection of the opening of an outflow path (9).

[0018] A three port connection valve (4) consists of an actuator (14) attached in a rectangular parallelepiped-like valve body (13) and this from the upper part. On a valve body (13) The inflow path for the 1st fluid of the letter of the abbreviation for L characters where an end carries out opening to a rear face, and the other end leads to the valve chest (15) through the outflow path for the 1st fluid (9) of a two port connection valve (3) (16), The inflow path for the 2nd fluid of the letter of the abbreviation for L characters (17) where the inflow path for the 1st fluid (16) sets caudad, an end carries out opening to a rear face, and the other end leads to the valve chest (15), and the outflow path (18) common to the 1st fluid and the 2nd fluid with which an end carries out opening to an inferior surface of tongue, and the other end leads to the valve chest (15) are prepared.

[0019] A three port connection valve (4) is a circular sulcus (15a) to a valve chest (15) base so that it is a diaphragm valve, and may expand to drawing 2 $R > 2$ and may be shown. It has, upper limit opening of the inflow path for the 1st fluid (16) leads to the posterior part of this circular sulcus (15a), and upper limit opening of an outflow path (18) leads to this anterior part. Thereby, the inflow path for the 1st fluid (16) and the outflow path (18) are made always open for free passage through the circular sulcus (15a) of the valve chest (15). And the annular valve seat (19) is prepared in the edge of upper limit opening of the inflow path for the 2nd fluid (17), and with vertical movement of the valve rod (20) by actuation of an actuator (14), when diaphragm (valve element) (21) moves up and down in the valve chest (15), it is made as [carry out / cutoff disconnection of this inflow path for the 2nd fluid (17)]. Drawing 2 (a) shows the open condition in which the valve rod (20) went up,

and the inflow path for the 2nd fluid (17) and the outflow path (18) are made to open it for free passage through the valve chest (15). Drawing 2 (b) shows the closed state to which the valve rod (20) descended, and the inflow path for the 1st fluid (16) and the outflow path (18) are made to open it for free passage even in this case.

[0020] Although the valve body (5) of a two port connection valve (3) and the valve body (13) of a three port connection valve (4) carried out the illustration abbreviation, they are combined with the bolt screwed in from the method of the right. The seal section (22) is prepared in the comparison section of the outflow path for the 1st fluid (9) of a two port connection valve (3), and the inflow path for the 1st fluid (16) of a three port connection valve (4), and the comparison section of the inflow path for the 2nd fluid (10) of a two port connection valve (3), and the inflow path for the 2nd fluid (17) of a three port connection valve (4), respectively.

[0021] In the back end section inferior surface of tongue of the valve body (5) of a two port connection valve (3) The block joint (23) which has the L character-like path (23a) which connects opening of the inflow path for the 2nd fluid (10) and process gas installation Rhine is formed. The block joint (24) which has the V character-like path (24a) which connects opening of an outflow path (18) and the inlet-port path of a massflow controller (2) is formed in the inferior surface of tongue of the valve body (13) of a three port connection valve (4). And ranging over the L character-like path block joint (23) and the V character-like path block joint (24), the cutoff disconnection machine (1) is attached with the screw thread from the upper part. The block joint (24) which has a V character-like path (24a) is formed also in the outlet side of a massflow controller (2), and the massflow controller (2) is attached with the screw thread from the upper part ranging over these V character-like path block joints (24). Each block joint (23) and (24) are attached in the substrate (25) with the screw thread from the upper part.

[0022] According to this fluid control unit, a two port connection valve (3) is made close, and by making a three port connection valve (4) open, if process gas is introduced into a three port connection valve (4), process gas will have a flow rate adjusted by the massflow controller (2), and will be sent to a process chamber. Then, if purge gas is introduced into a two port connection valve (3) by making a three port connection valve (4) close, making a two port connection valve (3) as open, purge gas will flow through a two port connection valve (3), a three port connection valve (4), and a massflow controller (2), and, thereby, will purge process gas from the inside of a fluid control device.

[0023] In case the 2nd fluid (this operation gestalt process gas) is poured, while making close the actuator (6) of a two port connection valve (3), that inflow path for the 2nd fluid (17) and outflow path (18) are made to open for free passage by making open the actuator (14) of a three port connection valve (4), and the 2nd fluid is introduced from the inflow path for the 2nd fluid (10) of a two port connection valve (3). Thereby, the 2nd fluid is sent to a massflow controller (2) through the inflow path for the 2nd fluid (10) of a two port connection valve (3), the inflow path for the 2nd fluid (17) of a three port connection valve (4), and this outflow path (18). Then, while making open the actuator (6) of a two port connection valve (3), the inflow path for the 2nd fluid (17) is intercepted by making close the actuator (14) of a three port connection valve (4), and the 1st fluid (this operation gestalt purge gas) is introduced from the inflow path for the 1st fluid (8) of a two port connection valve (3). Thereby, the 1st fluid is sent to a massflow controller (2) through the inflow path for the 1st fluid (8) of a two port connection valve (3), this outflow path (9), the inflow path for the 1st fluid (16) of a three port connection valve (4), and this outflow path (18). The 1st fluid drives out the 2nd fluid which remains in the valve chest (15) and the outflow path (18) of a three port connection valve (4) with the own pressure, and flows to the massflow controller (2), the condition that the 1st fluid and 2nd fluid were mixed is canceled quickly, and only the 1st fluid (purge gas) comes to flow for a short time.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing the cutoff disconnection machine by this invention.

[Drawing 2] It is the expanded sectional view of a three port connection valve.

[Drawing 3] It is the sectional view showing the conventional cutoff disconnection machine.

[Description of Notations]

- (1) Cutoff disconnection machine
- (3) Two port connection valve
- (4) Three port connection valve
- (6) Actuator
- (8) The inflow path for the 1st fluid
- (9) The outflow path for the 1st fluid
- (10) The inflow path for the 2nd fluid
- (14) Actuator
- (15) Valve chest
- (16) The inflow path for the 1st fluid
- (17) The inflow path for the 2nd fluid
- (18) Outflow path

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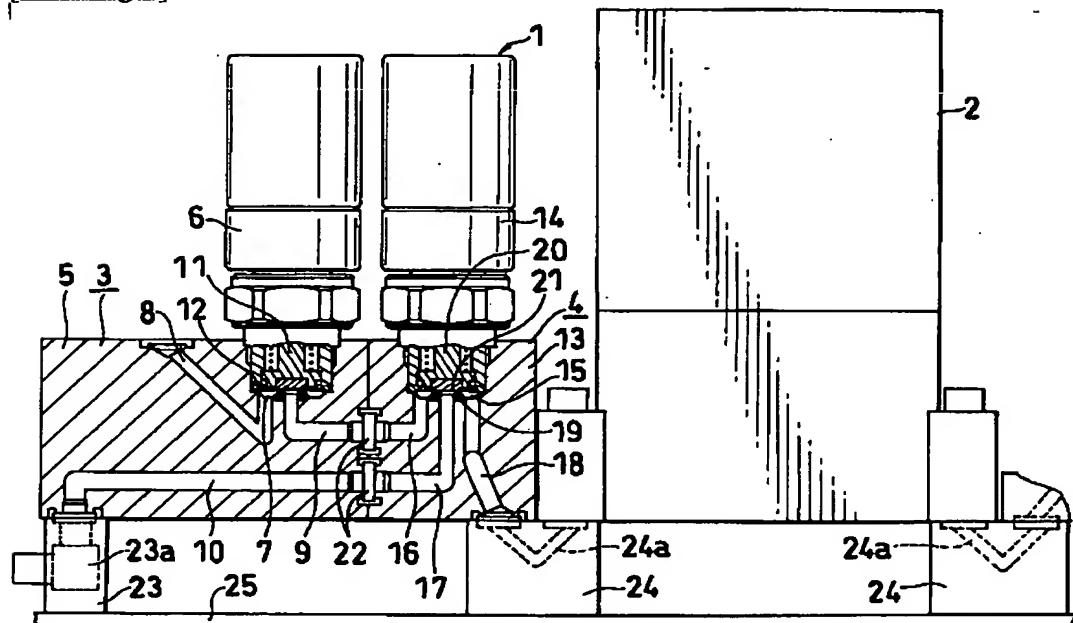
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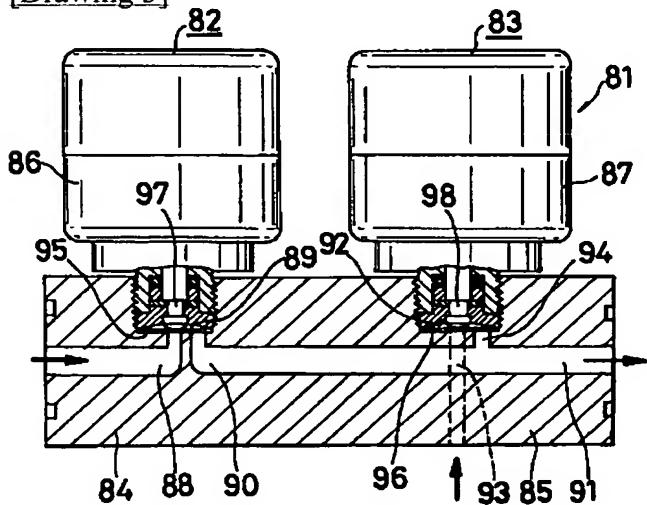
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DRAWINGS

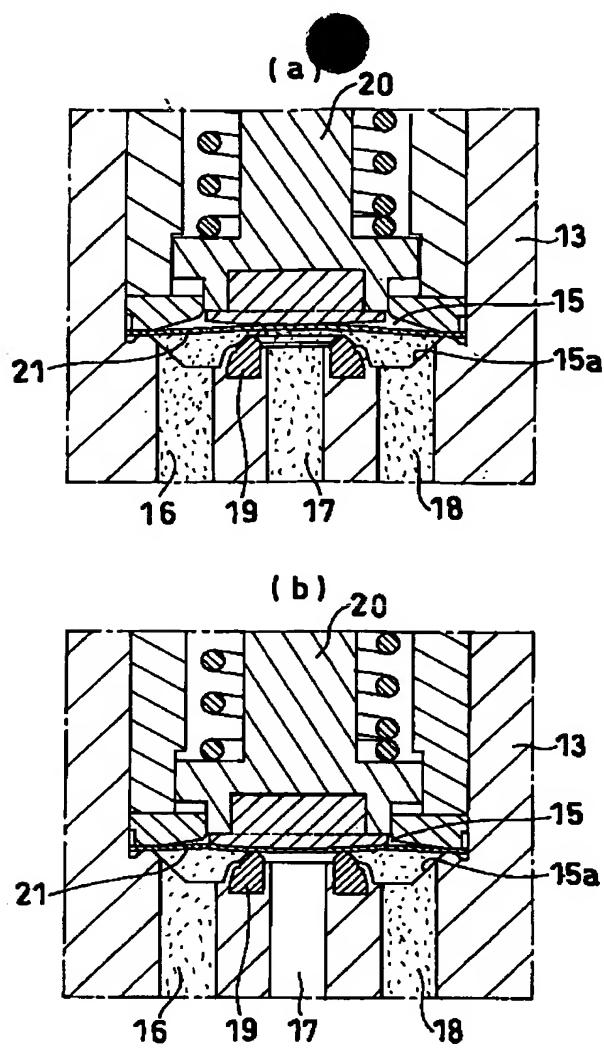
[Drawing 1]



[Drawing 3]



Drawing 2



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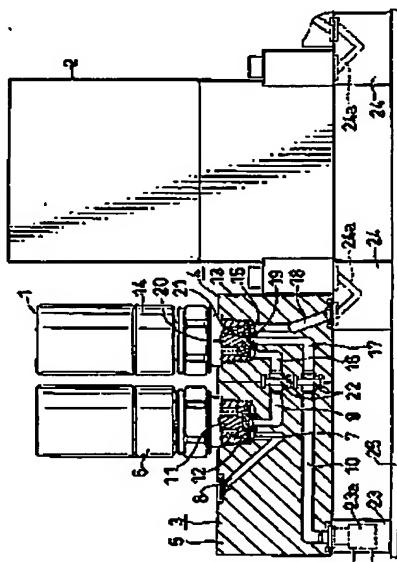
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(54)【発明の名稱】 連断開放器

(57)【要約】

【課題】 流体の置換が素早く行われて流体の純度が確保されるとともに、流体制御装置の簡便化を容易とする連断開放器を提供する。

【解決手段】 2ポート弁3と3ポート弁4とが隣り合わせに配置されている。3ポート弁4の第1流体用流入通路16と流出道路18とが弁室15を介して直時連通され、第2流体用流入通路17と流出通路19との連通がアクチュエータ14によって連断開放されている。3ポート弁4の第1および第2流体用流入通路15,17が突き合わせ面に、同流出通路18が下面にそれぞれ開口させられ、2ポート弁3の第1流体用流出通路9が3ポート弁4の第1流体用流入通路16と連通させられ、2ポート弁3に、3ポート弁4の第2流体用流入通路17に連通しつつ下面に開口している第2流体用流入通路10がさらに形成されている。



(2)

特開2001-254857

2

【特許請求の範囲】
 【請求項1】 第1流体用流入通路(8)および第1流体用流出通路(9)を有し、両通路(8)(9)間の追通がアクチュエータ(6)によって遮断開放される2ポート弁(3)と、第1流体用流入通路(16)、第2流体用流入通路(17)および第1流体と第2流体に共通の流出通路(18)を有し、第1流体用流入通路(16)と流出通路(18)とが弁室(15)を介して常時連通せられ、第2流体用流入通路(17)と流出通路(18)との追通がアクチュエータ(14)によって遮断開放される3ポート弁(4)とが競り合わせに配置されており。

3ポート弁(4)の第1および第2流体用流入通路(16)(17)が突き合せ面に、同流出通路(18)が下面にそれぞれ開口させられ、2ポート弁(3)の第1流体用流出通路(9)が3ポート弁(4)の第1流体用流入通路(16)に連通せられ、2ポート弁(3)に、3ポート弁(4)の第2流体用流入通路(17)に追通しつつ下面に開口している第2流体用流入通路(10)がさらに形成されている遮断開放器。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、半導体製造装置における流体制御装置等に用いられる遮断開放器に関するものである。特に、マスフローコントローラの入口などに設けられて、2種類の流体を適宜切り換えて流す遮断開放器に関するものである。

【0002】この明細書において、前後・上下・左右については、各図の右を前、左を後、上下を上下というもののとし、左右は前方に向かっていいうものとする。この前後・上下・左右は便宜的なもので、前後が逆になったり、上下が左右になったりして使用されることもある。

【0003】

【従来の技術】図3は、マスフローコントローラの流体入口側に設けられる従来の遮断開放器(81)を示している(特開平5-172265号公報参照)。従来の遮断開放器(81)は、後側の第1開閉弁(82)および前側の第2開閉弁(83)を備えている。両開閉弁(82)(83)は、いずれも2ポート弁であり、第1開閉弁(82)は、第1弁本体(84)および第1弁アクチュエータ(86)よりなり、第2開閉弁(83)は、第1弁本体(84)と一体に形成された第2弁本体(85)および第2弁アクチュエータ(87)よりなる。第1弁本体(84)は、第1流体用流入通路(88)と、この流入通路(88)に弁室(89)を介して追通しつつその連通が第1弁アクチュエータ(86)の操作により遮断開放される第1流体用流出通路(90)とを有している。第2弁本体(85)は、第1弁本体(84)の第1流体用流出通路(90)に常時追通し第1流体をマスフローコントローラの入口側に排出する主流出通路(91)と、一端が第2弁本体(85)の下面に開口し他端が弁室(92)に通じている第2流体用流入通路(93)と、一端側において第2流体用流出通路(93)と弁室(92)を介して連通しつつその追通が第2弁アクチュエータ(87)

の操作により遮断開放されるようになされているとともに、他端において主流出通路(91)と常時連通している第2流体用副流出通路(94)とを有している。図3において、(95)(96)はダイヤフラムを示し、弁アクチュエータ(86)(87)の操作による弁板(97)(98)の上下動に伴って、ダイヤフラム(95)(96)が弁室(89)(92)内において上下動することにより、各流入通路(88)(93)が遮断開放される。

【0004】この種の遮断開放器では、通常、第1の流体(例えばプロセスガス)を流した後、一旦この流れを遮断し、第2の流体(例えばバージガス)を流すことにより、第1の流体を遮断開放器外に排出して第2の流体に置換し、その後再び、第1の流体を流すという作業が行われる。上記従来の遮断開放器(81)において、第1の流体と第2の流体とを切り替えて流す場合、次のようになる。

【0005】まず、第1弁アクチュエータ(86)および第2弁アクチュエータ(87)を操作して、第1開閉弁(82)を開き、第2開閉弁(83)を閉じることにより、第1の流体が、第1弁本体(84)の流入通路(88)、同流出通路(90)および第2弁本体(85)の主流出通路(91)を経て、マスフローコントローラの入口側に導入される。このとき、第2流体用副流出通路(94)は第1の流体によって満たされることになる。次いで、第1弁アクチュエータ(86)および第2弁アクチュエータ(87)を操作して、第1開閉弁(82)を開き、第2開閉弁(83)を開じることにより、第2の流体が、第2流体用流入通路(93)、第2流体用副流出通路(94)および主流出通路(91)を経て、マスフローコントローラの入口側に導入される。このさい、第2の流体は、第2流体用副流出通路(94)およびこれに続く主流出通路(91)に残る第1の流体を自身の圧力により追い出して流れ、第1弁本体(84)の第1流体用流出通路(90)は、第2の流体に満たされることになる。

【0006】

【発明が解決しようとする課題】遮断開放器において、第1の流体と第2の流体とを切り替えて流す場合、流体の置換が素早く行われて流体の純度が確保されこと、非常に重要な性能となっている。

【0007】上記従来の遮断開放器(81)の第2開閉弁(83)において、第1の流体を流した後に、第2流体用流入通路(93)より第2の流体を導入したさい、第1弁本体(84)の第1流体用流出通路(90)が第1の流体の溜まり部になり、溜まり部にある第1の流体が第2の流体にわずかずつ混ざり、第2の流体が第1の流体に置換されにくいう問題があった。

【0008】また、この種の遮断開放器が使用される流体制御装置では、パネルに複数のブロック状維手を取り付け、これらのブロック状維手にまたがって遮断開放器を取り付けることにより、保守点検時に遮断開放器単独で上方に取り出すことができるよう組み立てるという

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集積化が進められているが、上記従来の遮断開放器では、弁本体の前面および後面に開口があり、このような集積化流体制御装置に用いるには不適当であるという問題もあった。

【0009】この発明の目的は、流体の置換が素早く行われて流体の純度が確保されるとともに、流体制御装置の集積化を容易とする遮断開放器を提供することにある。

【0010】

【課題を解決するための手段および発明の効果】この発明による遮断開放器は、第1流体用流入通路および第1流体用流出通路を有し、両通路間の遮断がアクチュエータによって遮断開放される2ポート弁と、第1流体用流入通路、第2流体用流入通路および第1流体と第2流体に共通の流出通路を有し、第1流体用流入通路と流出通路とが弁室を介して常時遮断させられ、第2流体用流入通路と流出通路との連通がアクチュエータによって遮断開放される3ポート弁とが隣り合わせに配置されており、3ポート弁の第1および第2流体用流入通路が突き合わせ面に、同流出通路が下面にそれぞれ開口させられ、2ポート弁の第1流体用流出通路が3ポート弁の第1流体用流入通路に連通させられ、2ポート弁に、3ポート弁の第2流体用流入通路に連通しかつ下面に開口している第2流体用流入通路がさらに形成されているものである。

【0011】この発明の遮断開放器によると、第2の流体（例えばプロセスガス）を流す際には、2ポート弁のアクチュエータを閉とするとともに、3ポート弁のアクチュエータを開としてその第2流体用流入通路と流出通路とを連通させ、第2の流体を2ポート弁の第2流体用流入通路から導入する。これにより、第2の流体は、2ポート弁の第2流体用流入通路、3ポート弁の第2流体用流入通路および同流出通路を経てマスフローコントローラなどに送られる。この後、2ポート弁のアクチュエータを開とするとともに、3ポート弁のアクチュエータを閉として第2流体用流入通路を遮断し、第1の流体（例えばバージガス）を2ポート弁の第1流体用流入通路から導入する。これにより、第1の流体は、2ポート弁の第1流体用流入通路、同流出通路、3ポート弁の第1流体用流入通路および同流出通路を経てマスフローコントローラなどに送られる。第1の流体は、自身の圧力によって3ポート弁の流出通路に残っている第2の流体を追い出して、マスフローコントローラへと流れていき、第1の流体と第2の流体が混ざり合った状態が素早く解消され、短時間で第1の流体だけが流れようになる。

【0012】また、この発明の遮断開放器によると、2ポート弁の下方に、その第2流体用流入通路に通じる通路を有するブロック状維手を配し、3ポート弁の下方に、その流出通路に通じる通路を有するブロック状維手

を配し、これら2つのブロック状維手にまたがるようにしてこの遮断開放器を取り付けることができ、これにより、遮断開放器を用いた流体制御装置を容易に集積化することができ、また、遮断開放器の保守点検も簡単にを行うことができる。

【0013】

【発明の実施の形態】この発明の実施の形態を、以下図面を参照して説明する。

【0014】図1に示すように、この発明による遮断開放器(1)は、マスフローコントローラ(2)の入口側（後側）に設けられて、半導体製造装置等において用いられる流体制御装置を構成する。

【0015】遮断開放器(1)は、後側の2ポート弁(3)と前側の3ポート弁(4)とが隣り合わせに配置されて構成されている。

【0016】2ポート弁(3)は、直方体状弁本体(5)およびこれの前部に上方から取り付けられたアクチュエータ(6)によりなり、弁本体(5)には、一端が後部上面に開口し他端が弁室(7)に通じている略V字状の第1流体用流入通路(8)と、一端が前面に開口し他端が弁室(7)に通じており第1流体用流入通路(8)との連通がアクチュエータ(6)によって遮断開放される略V字状の第1流体用流出通路(9)と、両通路(8)(9)の下方に位置し一端が後端部下面に開口し他端が前面に開口している略逆L字状の第2流体用流入通路(10)とが設けられている。

【0017】2ポート弁(3)は、ダイヤフラム弁であり、アクチュエータ(6)の操作による弁桿(11)の上下動に伴って、ダイヤフラム(12)が弁室(7)内において上下動することにより、流出通路(9)の開口を遮断開放するものである。

【0018】3ポート弁(4)も、直方体状弁本体(13)およびこれに上方から取り付けられたアクチュエータ(14)によりなり、弁本体(13)には、一端が後面に開口し2ポート弁(3)の第1流体用流出通路(9)に通じ他端が弁室(15)に通じている略L字状の第1流体用流入通路(16)と、一端が第1流体用流入通路(16)の下方において後面に開口し他端が弁室(15)に通じている略L字状の第2流体用流入通路(17)と、一端が下面に開口し他端が弁室(15)に通じている第1流体と第2流体に共通の流出通路(18)とが設けられている。

【0019】3ポート弁(4)は、ダイヤフラム弁で、図2に並大して示すように、弁室(15)底面に環状溝(15a)を有しており、この環状溝(15a)の後部に第1流体用流入通路(16)の上端開口が通じており、前部に流出通路(18)の上端開口が通じている。これにより、第1流体用流入通路(16)と流出通路(18)とは、弁室(15)の環状溝(15a)を介して常時連通させられている。そして、第2流体用流入通路(17)の上端開口の縁部に環状の弁座(19)が設けられており、アクチュエータ(14)の操作による弁桿(20)の上下動に伴って、ダイヤフラム(弁体)(21)が弁

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室(15)内において上下動することにより、この第2流体用流入通路(17)が遮断開放されるようになされている。図2(a)は、弁棒(29)が上昇した開状態を示しており、第2流体用流入通路(17)と流出通路(18)とが弁室(15)を介して連通させられている。図2(b)は、弁棒(29)が下降した閉状態を示しており、この場合でも、第1流体用流入通路(16)と流出通路(18)とは連通させられている。

【0020】2ポート弁(3)の弁本体(5)と3ポート弁(4)の弁本体(13)とは、図示省略したが右方からねじ込まれたボルトにより結合されている。2ポート弁(3)の第1流体用流出通路(9)と3ポート弁(4)の第1流体用流入通路(16)との突き台合わせ部および2ポート弁(3)の第2流体用流入通路(10)と3ポート弁(4)の第2流体用流入通路(17)との突き台合わせ部には、それぞれシール部(22)が設けられている。

【0021】2ポート弁(3)の弁本体(5)の後端部下面には、第2流体用流入通路(10)の開口とプロセスガス導入ラインとを接続するL字状通路(23a)を有するプロック総手(23)が設けられており、3ポート弁(4)の弁本体(13)の下面には、流出通路(18)の開口とマスフローコントローラ(2)の入口通路とを接続するV字状通路(24a)を有するプロック総手(24)が設けられている。そして、L字状通路プロック総手(23)とV字状通路プロック総手(24)とにまたがって、遮断開放器(1)が上方からのねじにより取り付けられている。V字状通路(24a)を有するプロック総手(24)は、マスフローコントローラ(2)の出口側にも設けられており、これらのV字状通路プロック総手(24)にまたがってマスフローコントローラ(2)が上方からのねじにより取り付けられている。各プロック総手(23)(24)は、基板(25)に上方からのねじにより取り付けられている。

【0022】この流体制御装置によると、2ポート弁(3)を閉、3ポート弁(4)を開として、3ポート弁(4)にプロセスガスを導入すると、プロセスガスは、マスフローコントローラ(2)により流量を調整され、プロセスチャンバーに送られる。この後、2ポート弁(3)を開、3ポート弁(4)を閉として、2ポート弁(3)にバージガスを導入すると、バージガスは、2ポート弁(3)、3ポート弁(4)、マスフローコントローラ(2)を経て流れ、これにより、流体制御装置内からプロセスガスをバージする。

【0023】第2の流体(この実施形態ではプロセスガス)を流す際には、2ポート弁(3)のアクチュエータ(6)を開とするとともに、3ポート弁(4)のアクチュエータ(14)を開としてその第2流体用流入通路(17)と流出通路(18)とを連通させ、第2の流体を2ポート弁(3)の第2流体用流入通路(10)から導入する。これにより、第2の流体は、2ポート弁(3)の第2流体用流入通路(10)、3ポート弁(4)の第2流体用流入通路(17)および同流出通路(18)を経てマスフローコントローラ(2)に送られる。

10 この後、2ポート弁(3)のアクチュエータ(6)を開とするとともに、3ポート弁(4)のアクチュエータ(14)を開として第2流体用流入通路(17)を遮断し、第1の流体(この実施形態ではバージガス)を2ポート弁(3)の第1流体用流入通路(8)から導入する。これにより、第1の流体は、2ポート弁(3)の第1流体用流入通路(8)、同流出通路(9)、3ポート弁(4)の第1流体用流入通路(16)および同流出通路(18)を経てマスフローコントローラ(2)に送られる。第1の流体は、自身の圧力によって3ポート弁(4)の弁室(15)および流出通路(18)に残っている第2の流体を追い出して、マスフローコントローラ(2)へと流れていき、第1の流体と第2の流体が混ざり合った状態が素早く解消され、短時間で第1の流体(バージガス)だけが流れようになる。

【図面の簡単な説明】

【図1】この発明による遮断開放器を示す断面図である。

【図2】3ポート弁の拡大断面図である。

【図3】従来の遮断開放器を示す断面図である。

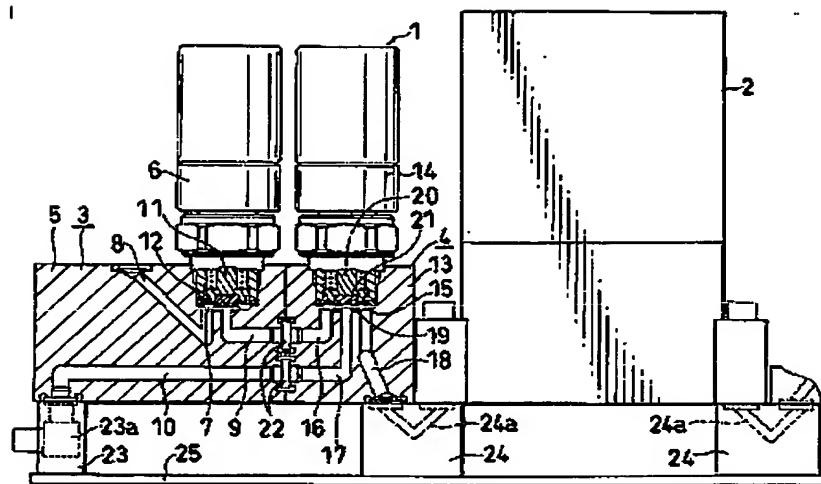
【符号の説明】

| | | |
|----|------|-----------|
| 30 | (1) | 遮断開放器 |
| | (3) | 2ポート弁 |
| | (4) | 3ポート弁 |
| | (6) | アクチュエータ |
| | (8) | 第1流体用流入通路 |
| | (9) | 第1流体用流出通路 |
| | (10) | 第2流体用流入通路 |
| | (14) | アクチュエータ |
| | (15) | 弁室 |
| | (16) | 第1流体用流入通路 |
| 40 | (17) | 第2流体用流入通路 |
| | (18) | 流出通路 |

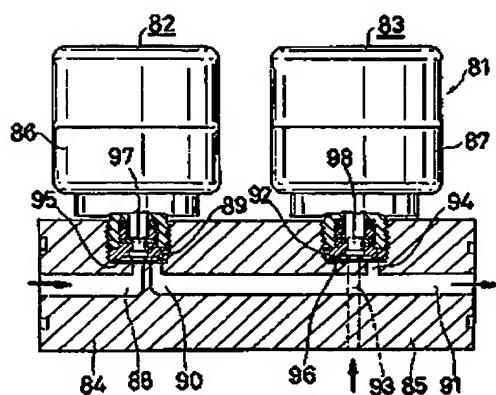
(5)

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【図1】



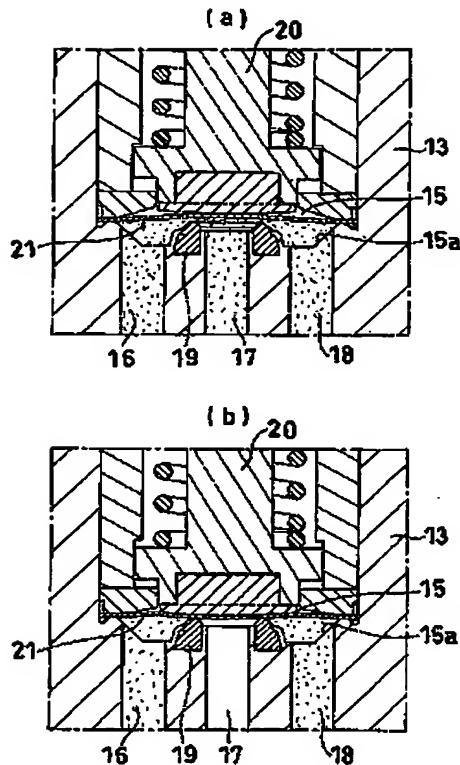
【図3】



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〔図2〕



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